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10/509,933	10/01/2004	Frederik Visser	PHNL020274US	4325

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EXAMINER

FETZNER, TIFFANY A

ART UNIT PAPER NUMBER

2859

DATE MAILED: 01/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/509,933

Applicant(s)

VISSER ET AL.

Examiner

Tiffany A. Fetzner

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 October 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Response to Arguments

2. Applicant's arguments filed 10/17/2005 have been fully considered but they are not persuasive, because the **amended limitation of independent claim 1**, which corresponds to **canceled claim 3**, is, contrary to applicant's arguments of the October 17th 2005 amendment and response, also a limitation taught by **Britain** as noted in the last office action. The examiner has further clarified how this limitation is taught by **Britain** since applicant has missed the presence of the weighed interpolation feature, because the feature is not recited with the words "weighted interpolation" immediately adjacent to one another. The fact that **Britain** weights the data sets based on the image desired in addition to "interpolating as necessary", is a direct teaching of a weighted interpolation even though the two words are not immediately adjacent as in applicant's claim. The feature required is still directly taught by the reference.

Drawings / Specification

3. The drawings are still objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description:

A) In **figure 2** components **s**, and **14** are **still** objected to as being not described in the original description of Figure 2. [See page 6 line 4 through page 7 line 5. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of

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any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The examiner notes that applicant appears to have overlooked the fact that components **s**, **w1**, **w2**, and **14** were objected to in the last office action and while the October 17th 2005 office action amends the specification to resolve the **w1**, **w2**, issue there are still some components, (i.e. **s** and **14**) which remain unaddressed.

Claim Objections

5. The objections to **Claims 6, 8, and 9** from the last office action are **rescinded** in view of the amendments of the October 17th 2005 amendment and response.

6. The objection to **Claim 6** from the last office action under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements, as per See MPEP § 2172.01 is **rescinded** in view of the amendments to **claim 6** via the October 17th 2005 amendment and response, which amends the claim to include the word increased. The amended word "increased" is not new matter because figure 2 as originally presented shows the limitations of claim 6 as amended in the October 17th 2005 amendment and response.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of **35 U.S.C. 102** that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. **Amended Claims 1, 2, 4-9** are **finally** rejected under **35 U.S.C. 102(e)** as being anticipated by **Britain US Patent application publication 2002/0140423 A1** published

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October 3rd 2002, filed October 5th 2001. The effective US priority date of this reference is October 5th 2001.

9. **Amended Claims 1, 2, 4-9** are also finally rejected under **35 U.S.C. 102(e)** as being anticipated by **Britain** US Patent **6,794,869 B2** issued September 21st 2004, filed October 5th 2001; which corresponds to **Britain** US Patent application publication 2002/0140423 A1 published October 3rd 2002, filed October 5th 2001. The effective US priority date of this reference is October 5th 2001. [Applicant note all citations are from the Britain US Patent application publication 2002/0140423 A1, since the same teachings are found in both references for the sake of brevity.]

10. With respect to **Claim 1**, **Britain** teaches and shows "A method of data processing" [See figures 5, 10] "to form a compound object" (i.e. a final MRI image) "data set from a plurality of basis datasets" (i.e. the Kz, Ky and Kx datasets, which are basis datasets from which the final image is constructed.) [See the **Britain** abstract, page 1 paragraph [0010] through page 10 paragraph [0077]]. **Britain** teaches and shows "the basis datasets" (i.e. the Kz, Ky and Kx datasets) "assigning data values to spatial positions in an at least three-dimensional space", [See figures 5, 10, 2, 3, 8; page 2 paragraph [0012] 2nd to last sentence, page 2 paragraph [0013] 3rd to last sentence, page 3 paragraphs [0034], [0035]; page 4 paragraph [0042] through page 5 paragraph [0043]; page 6 paragraph [0049] where "gridding" of the Kz, Ky, and Kx datasets necessarily "assigns spatial positions in an at least three-dimensional space", before the Fourier Transformation to produce the final resulting image. See also page 6 paragraph [0050] through page 10 paragraph [0077], where numerous ways of aligning, regridding, and matching of positions before Fourier transformation, and/or during reconstruction of the final image.] **Britain** teaches and shows "the basis datasets" (i.e. the Kz, Ky and Kx datasets) "being associated with mutually overlapping regions" [See page 6 paragraph [0051], page 8 paragraph [0067], page 9 paragraph [0075] and figures 2, 3, and 8 which show how the data regions assigned can mutually overlap.] "the method comprising the step of deriving compound data values" (i.e. interpolating the acquired data as necessary to improve the accuracy of the alignment, page 7 paragraph [0059]) "for spatial positions in the overlapping regions from data values of

respective basis datasets" (i.e. the Kz, Ky and Kx datasets) [See page 6 paragraph [0051], pages 8-9 paragraphs [0067], [0071], and [0075].

11. **Britain** also teaches the **amended limitation** of October 17th 2005 that "the calculation of compound data values involves a weighted interpolation", because the images produced by **Britain** are **weighted** based on the type of 3D or 2D image desired, and **Britain** also teaches "**interpolating the acquired Kz, Ky and Kx datasets**" (i.e. the datasets which comprise the type of 3D or 2D image desired) "**as necessary** to improve the alignment of anatomic locations, the correction of non-linearities and have the largest impact on image contrast." [See page 7 paragraph [0057] through page 10 paragraph [0077], especially interpolating paragraph [0059] where first the z direction, and then the other directions are utilized and paragraph [0061] which teaches multidimensional k-space acquisition taken in combination with one another.] Because the interpolated acquired k-space datasets **Kz, Ky, and Kx** are weighted based upon the type of image desired, **Britain** does teach, contrary to applicant's arguments of the October 17th 2005 response the limitation that "the calculation of compound data values involves a weighted interpolation.

12. With respect to **Claim 2**, **Britain** teaches and shows "the compound data values are calculated by interpolation between data values of the basis datasets and for corresponding positions in the overlapping regions." [See page 6 paragraph [0051], page 7 paragraph [0059], pages 8-9 paragraphs [0067], [0071], and [0075] and figures 2, 3, and 8 which show how the data regions assigned can mutually overlap.] The same reasons for rejection, that apply to **claim 1** also apply to **claim 2** and need not be reiterated.

13. With respect to **Claim 4**, **Britain** teaches and shows "that the weights for data values of individual basis datasets" (i.e. the Kz, Ky and Kx datasets) "are associated with their spatial positions in the respective spatial regions of said basis datasets" [See figures 5, 10, 2, 3, and 8] "and for respective basis datasets" [See page 4 paragraph [0043] through page 9 paragraph [0075] where all of the weighting parameters may be varied as desired for each k-space subset (i.e. the Kz, Ky and Kx datasets), and any k-space trajectory pattern may be used, to compile data from different positions, to their

anatomically matched locations.] **Britain** also teaches and shows that "the weights are non-decreasing" (i.e. the weighing is constant or equal) "with distance to an edge of the spatial region of the basis dataset concerned." [See page 4 paragraphs [0036], [0037]; page 7 paragraph [0065] through page 8 paragraph [0067]; page 9 paragraph [0072] where the ability to have equal subsets as one option of implementation is taught.] The same reasons for rejection, that apply to **claims 1, 2**, also apply to **claim 4** and need not be reiterated.

14. With respect to **Claim 5**, **Britain** teaches and shows at least one embodiment in which "the respective basis datasets have neighboring spatial regions and said increasing of the weights with distance to an edge of the spatial region of the basis dataset concerned is dependent on the overlap between the neighboring spatial regions." [See page 6 paragraphs [0050], [0051], [0052] pages 7-8 paragraph [0059] through [0066], pages 8-9 paragraphs [0067], [0071], and [0075] and figures 2, 3, and 8 which show how the neighboring data regions assigned can mutually overlap.] The same reasons for rejection, that apply to **claims 1, 2, 4**, also apply to **claim 5** and need not be reiterated.

15. With respect to **Amended Claim 6**, **Britain** shows from the **combination of figures 2 and 8, or the combination of figures 2 and 3** that "wherein said generally increasing with distance with respect to an edge of the spatial region of the basis dataset concerned is more strongly increased as there is less overlap between the adjacent spatial regions. [See the **combination of figures 2 and 8, or the combination of figures 2 and 3** where the overlap of adjacent spatial edge regions with respect to distance in either figures 2 or 8 is approximately (i.e. by visual inspection) 1/4 -1/5; while the overlap of adjacent spatial edge regions with respect to distance in figure 3 is approximately (i.e. by visual inspection) 1/8 – 1/10; which results in their being "less overlap between the adjacent spatial regions" of figure 3 than in figures 2 or 8.] The same reasons for rejection, that apply to **claims 1, 4, 5** also apply to **claim 6** and need not be reiterated.

16. With respect to **Claim 7**, **Britain** teaches and shows that "individual basis datasets are reconstructed from magnetic resonance signals." [See abstract, figure 1,

page 1 paragraph [0002] through page 2 paragraph [0014]] The same reasons for rejection, that apply to **claim 1**, also apply to **claim 7** and need not be reiterated.

17. With respect to **Claim 8**, **Britain** teaches and shows that "the basis datasets include **[a]** data values that are encoded in three independent spatial directions of a multitude of two-dimensionally encoded data subsets." [See the entire **Britain** reference, as this limitation is a main concept of the entire reference. See also the abstract, figures 5, 10, and 11.] The same reasons for rejection, obviousness, and motivation to combine, that apply to **claim 1**, also apply to **claim 9** and need not be reiterated.

18. With respect to Amended **Claim 9**, **Britain** teaches and shows "A method as claimed in **claim 8**, wherein for individual basis data sets, sets of magnetic resonance signals are successively acquired for the respective positions in one spatial encoding direction or for the respective two-dimensional data subsets and where the order of acquisition runs from the centre towards the edge of the spatial region of the basis dataset concerned." [See figure 1, abstract, page 1 paragraph [0009] through page 2 paragraph [0014] and the k-space center out teachings of page 6 paragraph [0049], [0050], page 7 paragraphs [0061] through [0065].] The same reasons for rejection, which apply to **claims 1, 8** also apply to **claim 9** and need not be reiterated.

19. **Claims 1, 2, 4, 5, 7, and 8** are also finally rejected under **35 U.S.C. 102(b)** as being anticipated by **Sodickson** US Patent **5,910,728** issued June 8th 1999. This rejection being necessitated by the applicant's October 17th 2005 amendment of the independent claims. The examiner notes that this reference was also noted on the PTO 892 form of cited prior art provided with the last office action of June 14th 2005.

20. With respect to **Amended Claim 1**, **Sodickson** teaches and shows "A method of data processing" [See abstract, col. 1 lines 9-13; col. 6 lines 24-32; col. 10 line 41 through col. 11 line 17; col. 17 lines 1-53; figure 1] "to form a compound object" (i.e. a final MRI image) "data set from a plurality of basis datasets" (i.e. the weighted spatial harmonics which replace phase encoded k-space gradient datasets, which are basis datasets from which the final image is constructed.) [See the **Sodickson** abstract, col. 4 line 23 through col. 17 line 53.] **Sodickson** teaches and shows "the basis datasets" (i.e.

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the different spatial harmonics "0" and "1" of figure 5 which are formed from the differently combined weighted coils datasets of figure 5.) **Sodickson** also teaches "assigning data values to spatial positions in an at least three-dimensional space", because a two dimensional array of coils with a second array apace apart from the two dimensional array, (i.e. below it) is an intrinsic teaching that the coils of **Sodickson** are located in "spatial positions in an at least three-dimensional space" [See figure 1] The step of "assigning data values to the spatial positions" is taught from the **Sodickson** abstract, and the teachings of col. 4 line 23 through col. 17 line 53. This feature is also shown via figures 5 and 5a, where the differently weighted combined coil signal harmonics are aligned and interleaved to produce the final resulting image.] **Sodickson** teaches and shows "the basis datasets" (i.e. the different spatial harmonics "0" and "1" of figure 5 which are formed from the differently combined weighted coils datasets of figure 5.) "being associated with mutually overlapping regions" [See figures 3 and 2b; col. 4 lines 23-54 which show and teach how the sensitivity data regions assigned can mutually overlap.] "the method comprising the step of deriving compound data values" (i.e. interpolating the acquired data as necessary to improve the accuracy of the alignment, col. 10 line 41 through col. 12 line 7 where data is interpolated and then properly positioned (i.e. aligned) within the proper matrix position "for spatial positions in the overlapping regions from data values of respective basis datasets" (i.e. the different spatial harmonics "0" and "1" of figure 5 which are formed from the differently combined weighted coils datasets of figure 5.) [See col. 4 line 23 through col. 17 line 53.]

21. **Sodickson** also teaches the **amended limitation** of October 17th 2005 that "the calculation of compound data values involves a weighted interpolation", [See col. 10 line 60 through col. 11 line 3], because the images produced by **Sodickson** are **weighted** based on the respective coil sensitivities, and **Sodickson** also teaches the use of a "**interpolative mechanism**" **for generating the weights prior to combining the acquired signals.** [See col.10 line 60 through col. 11 line 3 specifically and col. 4 line 23 through col. 17 line 53 in general.]

22. With respect to **Claim 2**, **Sodickson** teaches and shows "the compound data values are calculated by interpolation between data values of the basis datasets and for

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corresponding positions in the overlapping regions." [See figures 5, and 5a; col.10 line 60 through col. 11 line 3, specifically and col. 4 line 23 through col. 17 line 53 in general; which show how the data regions assigned can mutually overlap.] The same reasons for rejection, that apply to **claim 1** also apply to **claim 2** and need not be reiterated.

23. With respect to **Claim 4**, **Sodickson** teaches and shows "that the weights for data values of individual basis datasets" (i.e. the different spatial harmonics "0" and "1" of figure 5 which are formed from the differently combined weighted coils datasets of figure 5.) "are associated with their spatial positions in the respective spatial regions of said basis datasets" [See figures 5, 5a] "and for respective basis datasets" [See col. 4 line 23 through col. 17 line 53; where all of the weighting parameters may be varied as desired for each k-space spatial harmonic subset, and parallel or flow through signal acquisition used to compile data from different positions, to their anatomically coil sensitivity matched locations.] **Sodickson** also shows that "the weights are non-decreasing" (i.e. the weighing is constant or equal) "with distance to an edge of the spatial region of the basis dataset concerned." [See figure 3 where the overlap is shown to be a constant amount.] The same reasons for rejection, that apply to **claims 1, 2**, also apply to **claim 4** and need not be reiterated.

24. With respect to **Claim 5**, **Sodickson** teaches and shows at least one embodiment in which "the respective basis datasets have neighboring spatial regions and said increasing of the weights with distance to an edge of the spatial region of the basis dataset concerned is dependent on the overlap between the neighboring spatial regions." [See col. 4 lines 23-53, especially col. 4 lines 26-37. which teaches that the coils each have a different position in the image volume and that each coil has **a different but at least partially overlapping sensitivity**, and directly implies that the overlap is not necessarily the same for each coil, because the coils each have a different but at least partially overlapping sensitivity.] The same reasons for rejection, that apply to **claims 1, 2, 4**, also apply to **claim 5** and need not be reiterated.

25. With respect to **Claim 7**, **Sodickson** teaches and shows that "individual basis datasets are reconstructed from magnetic resonance signals." [See abstract, figure 1,

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col. 1 lines 6-14; col. 4 lines 23-53.] The same reasons for rejection, that apply to **claim 1**, also apply to **claim 7** and need not be reiterated.

26. With respect to **Amended Claim 8**, **Sodickson** teaches and shows that "the basis datasets include data values that are encoded in three independent spatial directions of a multitude of two-dimensionally encoded data subsets." [See figure 1 and col. 16 line 6 through col. 17 line 53.] The same reasons for rejection, obviousness, and motivation to combine, that apply to **claim 1**, also apply to **claim 9** and need not be reiterated.

27. Applicant's amendment of October 17th 2005 necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

28. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Prior art of Record

29. The **prior art made of record** and not relied upon is considered pertinent to applicant's disclosure. [See the **entire list** of references on the attached examiner's notice of references cited.]

A) **Liu** US patent 6,043,654 Issued March 28th 2000.

B) **Parker et al.**, US patent 5,167,232 issued December 1st 1992.

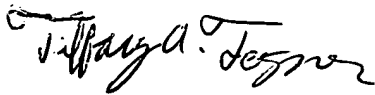
C) All of the other **Britain** and **Britain et al.**, references listed of the 892 which are connected to the cited **Britain** reference above.

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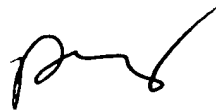
Conclusion

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: (571) 272-2241. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

31. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached at (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is **(703) 872-9306**.



TAF
December 30, 2005



Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800